PATENT SPECIFICATION 747,972

Date of filing Complete Specification : June 11, 1954.

Application Date : July 21, 1953. No. 20148/53.

Complete Specification Published : April 18, 1956.

Index at Acceptance :—Class 103(1), E2M2K1, E2N1A(1 : 2 : 4A2 : 5), E2N1D(2B : 6B), E2N1(E5 : K1).

COMPLETE SPECIFICATION.

Improvements in Automatic Adjusting Devices for Brakes.

ERRATUM

SPECIFICATION NO. 747,972

Page 1, line 14, *for* "7380034" *read* "738,034".

THE PATENT OFFICE,
1st January, 1957

DB 41485/1(2)/3640 150 12/56 R

the friction members and means for moving said friction members a predetermined distance away from the disc after each application of the brakes. The automatic adjustment means is described as comprising a pin having one end associated with a friction pad, a sleeve longitudinally slotted at one end to fit over said pin, the slotted end being threaded, and a nut screwed on to said end having a tapered portion co-operating with a tapered portion on said end, whereby a predetermined degree of interference between the pin and sleeve is provided.

The object of the present invention is to provide an alternative automatic adjustment means which achieves the same ends but which is more economical to manufacture.

According to the present invention a brake comprises a rotatable braking member, a non-rotatable friction member to frictionally engage said braking member, a mechanism to effect said engagement, an elastically-deformable pin or like means having one end associated with said friction member, a sleeve slidably fitted over said pin or like means and movable between two fixed stops, said sleeve having a predetermined degree

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friction member move back together under the spring load. Alternatively the spring means may be removed from direct association with the pin and sleeve, retraction of the friction pads being effected by means of a spring associated with the brake applying mechanism. Preferably the pin is so constructed that it is elastically deformable, i.e. inwardly springy, within its elastic limits, and is inwardly deformed by a cylindrical metal sleeve slidable thereon.

The invention will now be described with reference to the accompanying drawings, of which:—

Figure 1 is a section of part of a brake constructed according to the invention;

Figure 2 is an enlarged section of the automatic adjusting means incorporated in the brake of Figure 1;

Figure 3 is a section of part of a brake constructed according to a further embodiment of the invention;

Figures 4 and 5 are cross-sectional views of separate embodiments of the pin which may be incorporated in the brakes illustrated at Figures 1, 2 and 3.

In one embodiment of the invention

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COMPLETE SPECIFICATION.

Improvements in Automatic Adjusting Devices for Brakes.

We, DUNLOP RUBBER COMPANY LIMITED, a British Company, of 1 Albany Street, London, N.W.1, and HENRY JAMES BUTLER, a British Subject, of the DUNLOP RIM AND WHEEL COMPANY LIMITED, Foleshill, Coventry, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to brakes, and more particularly to brakes for motor vehicles.

In our co-pending Application No. 5672/53 (Serial No. 7380,034) a disc brake is described which comprises automatic adjustment means to compensate for wear of the friction members and means for moving said friction members a predetermined distance away from the disc after each application of the brakes. The automatic adjustment means is described as comprising a pin having one end associated with a friction pad, a sleeve longitudinally slotted at one end to fit over said pin, the slotted end being threaded, and a nut screwed on to said end having a tapered portion co-operating with a tapered portion on said end, whereby a predetermined degree of interference between the pin and sleeve is provided.

The object of the present invention is to provide an alternative automatic adjustment means which achieves the same ends but which is more economical to manufacture.

According to the present invention a brake comprises a rotatable braking member, a non-rotatable friction member to frictionally engage said braking member, a mechanism to effect said engagement, an elastically-deformable pin or like means having one end associated with said friction member, a sleeve slidably fitted over said pin or like means and movable between two fixed stops, said sleeve having a predetermined degree of interference with said pin, and a spring to urge the sleeve from one stop to the other thereby moving the friction member a predetermined distance from said braking member after each application of the brakes.

The arrangement of the pin or like means and sleeve is such that on the application of braking pressure they move together with the associated friction member against a spring load for a predetermined distance towards the braking member until the sleeve abuts a fixed member, and if full braking pressure is not then obtained, e.g. on account of wear, the pin or like means slips through the sleeve for the required distance. On release of braking pressure the pin, sleeve and friction member move back together under the spring load. Alternatively the spring means may be removed from direct association with the pin and sleeve, retraction of the friction pads being effected by means of a spring associated with the brake applying mechanism. Preferably the pin is so constructed that it is elastically deformable, i.e. inwardly springy, within its elastic limits, and is inwardly deformed by a cylindrical metal sleeve slidable thereon.

The invention will now be described with reference to the accompanying drawings, of which:—

Figure 1 is a section of part of a brake constructed according to the invention;

Figure 2 is an enlarged section of the automatic adjusting means incorporated in the brake of Figure 1;

Figure 3 is a section of part of a brake constructed according to a further embodiment of the invention;

Figures 4 and 5 are cross-sectional views of separate embodiments of the pin which may be incorporated in the brakes illustrated at Figures 1, 2 and 3.

In one embodiment of the invention

[Price

(Figure 1) the rotatable braking member is an annular disc 1 and the friction members are friction pads 2, axially slidable one on each side of the disc in the limbs of a non-rotatable caliper 3 straddling a part of the outer periphery of the disc. A backing plate 4 is provided for each friction pad 2 and a fluid pressure operated piston and cylinder mechanism 5 is secured to each limb of the caliper 3 to force the backing plates 4 towards the disc 1 and hence the associated friction pads 2 into frictional contact with the disc.

In conjunction with this brake there are provided mechanisms (Figure 2) one on each side of each brake cylinder for moving the friction pads clear of the disc when the braking pressure is removed, and said mechanism also comprise means for automatically compensating for wear of the pads.

Such mechanism comprises a tubular pin 6 (Figure 2) flanged at one end and longitudinally slotted along its length. The flanged end of the pin 6 is associated with a backing plate 4 and a pad of friction material 2 abuts the backing plate. The pin 6, by virtue of its slot is inwardly springy, and a cylindrical sleeve 7 is frictionally fitted over the pin, said sleeve being provided at one end with an outwardly-extending annular flange 8. The pin and sleeve extend axially through a hole 9 alongside the cylinder, the axis of the hole being parallel to the axis of the cylinder. The hole 9 is stepped, the smaller diameter end thereof being adjacent the disc 1 and an annular member 10 is fitted on the step thus formed. A cylindrical distance piece 11 is fitted within the larger diameter end of the hole, one end thereof abutting the annular member 10 and the other end being provided with an inwardly-formed shoulder 12. The annular flange 8 of the sleeve 7 is located between said shoulder 12 and said member 10. A helically wound spring 13 is fitted between the said shoulder 12 and a part 14 spun on to the end of the sleeve 7 remote from the flange 8.

The annular flange 8 of the sleeve 7 is normally seated on the shoulder 12 of the distance piece 11 and is capable of making a limited movement between said shoulder 12 and the member 10 seated on the step of the hole 9 alongside the cylinder, and this distance represents the clearance of the pad 2 from the disc 1 when the braking pressure is removed, i.e. when the brake is idle.

When braking pressure is applied to the piston and cylinder mechanism the friction pads 2 associated therewith are forced by the backing plate 4 into frictional engagement with the disc, thereby braking the wheel. Movement of the backing plate 4 in this direction draws the pins 6 and the sleeve 7 frictionally engaging therewith in the same direction and against the resistance of the springs 13. On removal of the braking pressure the springs 13, acting through the sleeve 7, move the pins 6 back to their previous position, thus moving the backing plates 4 and allowing the pads 2 to move away from the disc to provide the predetermined degree of clearance.

If, on applying the brakes, the annular flange 8 abuts the member 10 before full frictional engagement between the pad 2 and the disc 1 is effected, due e.g. to wear of the pad, then the braking pressure will cause the pins 6 to slip through the sleeves 7 until full frictional engagement is effected. On removing the braking pressure the springs 13 will retract the backing plates 4 and allow the pads 2, as previously explained, to effect the predetermined running clearance.

In a further embodiment of the invention (Figure 3) the disc 1, friction pads 2, caliper 3, backing plate 4, and pins 6 are as previously described. The fluid pressure operated mechanism 5 is supplemented by the addition of a spiral tension spring 15 having one end secured to the base of the cylinder and the other end to the adjacent side of the piston, thereby to withdraw the piston, and the backing plate which is pivotally secured thereto, away from the disc upon release of braking pressure.

The holes 9 are internally threaded for a short distance inwardly from the ends thereof remote from the disc, and a hollow plug 16 closed at one end is located in each hole being secured therein by means of a threaded portion 17 which engages with the threaded portion of the hole 9. A sleeve 18 is located on each of the pins 6 in frictional engagement therewith in such a position that its axial movement in one direction is limited by the step formed in the hole 9, and in the other direction by the end of the plug 16.

On application of braking pressure, the piston of each mechanism moves toward the disc against the tension of spring 15 to effect frictional engagement between the pads 2 and disc 1. If however the sleeve 18 abuts the step of the hole 9 before full frictional engagement is effected due, e.g. to wear of the pad, then the braking pressure will cause the pins 6 to slip through the sleeves 18 until full frictional engagement is effected. On removing the braking pressure, the spring 15 will retract the assembly of piston, backing plate and pins until the sleeves 18 abut the ends of the associated plugs 16 thereby effecting the predetermined running clearance.

Instead of the pin being tubular and slotted, as hereinabove described and illustrated in Figure 4, it may be solid and provided with a longitudinal slot extending throughout its length (Figure 5), the slot having a depth equal to about three-quarters of its diameter. The parts of the pin on each side of the slot will thus be elastically deformed

when a sleeve of suitable internal diameter is fitted thereon.

The pads may be cemented or otherwise secured to the backing plates.

Whilst the automatic adjustment with retraction means has been described in connection with a disc brake, it is, with minor modifications, equally applicable to a drum brake.

We are aware of British Patent No. 688,382 which claims a disc brake assembly for motor vehicles and the like comprising an annular brake disc engaging with a wheel and rotatable therewith, a non-rotatable housing straddling a periphery of said disc and covering a portion only of the braking surfaces thereof and provided with at least one pair of co-axial cylinders, one on each side of the disc, each cylinder being connected to a source of fluid pressure, a plunger fluid-tightly slidable in each cylinder and a pad of friction material interposed between each plunger and the adjacent face of the disc, whereby frictional engagement is effected between the disc and pads when the cylinders are pressurized.

What we claim is:—

1. A brake comprising a rotatable braking member, a non-rotatable friction member to frictionally engage said braking member, a mechanism to effect said engagement, an elastically-deformable pin or like means having one end associated with said friction member, a sleeve slidably fitted over said pin or like means and movable between two fixed stops, said sleeve having a predetermined degree of interference with said pin, and a spring to urge the sleeve from one stop to the other thereby moving the friction member a predetermined distance from said backing member after each application of the brakes.

2. A brake according to Claim 1 wherein the said predetermined degree of interference is such that upon application of braking pressure the pin and sleeve move together until the sleeve abuts one of said fixed stops whereafter the pin may move relative to the sleeve to compensate for wear of said friction member.

3. A brake according to either of the preceding claims wherein the mechanism to effect said engagement comprises a piston and cylinder.

4. A brake according to Claim 3 wherein a backing plate is pivotally associated with an adjacent face of said piston and the friction member is secured to the side of the backing plate remote from the piston.

5. A brake according to Claim 4 wherein said spring is wound helically around said sleeve, one end abutting a shoulder at one end of said sleeve and the other end abutting the outer face of the stop remote from the friction member.

6. A brake according to Claim 4 wherein said spring has one end associated with said cylinder and the other end with said piston to urge the piston towards the base of the cylinder and acts on the sleeve through the piston, backing plate and pin.

7. A brake according to any of the preceding claims wherein the pin is tubular and is longitudinally slotted to make it inwardly resilient.

8. A brake according to any of Claims 1 to 6 wherein the pin is solid and is provided with a longitudinally-extending slot to make it inwardly resilient.

9. A disc brake comprising a rotatable disc, a non-rotatable caliper straddling a periphery of the disc and means carried by each limb of the caliper for effecting braking pressure on the disc which comprises a cylindrical pad of friction material slidable through a hole in each of said limbs, a piston and cylinder mechanism secured to each limb to effect said frictional engagement, two elastically deformable pins each having one end associated with a friction pad and extending axially through passages diametrically opposed one on each side of said cylinder, a sleeve within each passage slidably fitted over each pin and movable between two fixed stops and having a predetermined degree of interference with said pin and a helical spring fitted in compression between a shoulder at one end of said sleeve and an adjacent fixed stop.

10. A brake constructed and arranged as herein described and as illustrated in Figures 1, 2 and 4 of the accompanying drawings.

11. A brake constructed and arranged as herein described and as illustrated in Figures 1, 2 and 5 of the accompanying drawings.

12. A brake constructed and arranged as herein described and as illustrated in Figures 3 and 4 of the accompanying drawings.

13. A brake constructed and arranged as herein described and as illustrated in Figures 3 and 5 of the accompanying drawings.

G. W. I. SHEAVYN,
Agent for the Applicants.

PROVISIONAL SPECIFICATION.

Improvements in Automatic Adjusting Devices for Brakes.

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This invention relates to brakes, and more

particularly to brakes for motor vehicles.

In our co-pending Application No. 5672/53 (Serial No. 738,034) a disc brake is described which comprises automatic adjustment means to compensate for wear of the friction members and means for moving said friction members a predetermined distance away from the disc after each application of the brakes. The automatic adjustment means is described as comprising a pin having one end associated with a friction pad, a sleeve longitudinally slotted at one end to fit over said pin, the slotted end being threaded, and a nut screwed on to said end having a tapered portion co-operating with a tapered portion on said end, whereby a predetermined degree of interference between the pin and sleeve is provided.

The object of the present invention is to provide an alternative automatic adjustment means which achieves the same ends but which is more economical to manufacture.

According to the present invention a brake comprises a rotatable braking member, a non-rotatable friction member to frictionally engage said braking member, a mechanism to effect said engagement, a pin or like means having one end associated with said friction member, a sleeve slidably fitted over said pin or like means and having a predetermined degree of interference therewith whereby the said pin or like means can be moved along the sleeve to compensate for wear of the friction member, and spring means co-operating with said sleeve to move the friction member a predetermined distance away from said braking member after each application of the brakes.

Preferably the arrangement of the pin or like means and sleeve is such that on the application of braking pressure they move together with the associated friction member against a spring load for a predetermined distance towards the braking member until the sleeve abuts a fixed member, and if full braking pressure is not then obtained, e.g. on account of wear, the pin or like means slips through the sleeve for the required distance. On release of braking pressure the pin, sleeve and friction move back together under the spring load. Preferably the pin is so constructed that it is elastically deformable, i.e. inwardly springy, within its elastic limits, and is inwardly deformed by a cylindrical metal sleeve slidably thereon.

In one embodiment of the invention the rotatable braking member is an annular disc and the friction members are friction pads, axially slidable one on each side of the disc in the limbs of a non-rotatable caliper straddling a part of the outer periphery of the disc. A braking plate is provided for each friction pad and a fluid pressure operated piston and cylinder mechanism is secured to each limb of the caliper to force the backing plates towards the disc and hence the associated friction pads into frictional contact with the disc.

In conjunction with this brake there are provided mechanisms one on each side of each brake cylinder for moving the friction pads clear of the disc when the braking pressure is removed, and said mechanism also comprise means for automatically compensating for wear of the pads.

Such mechanism comprises a tubular pin flanged at one end and longitudinally slotted along its length. The flanged end of the pin is associated with a backing plate and a pad of friction material abuts the backing plate. The pin, by virtue of its slot, is inwardly springy, and a cylindrical sleeve is frictionally fitted over the pin, said sleeve being provided at one end with an outwardly extending annular flange. The pin and sleeve extend axially through a hole alongside the cylinder, the axis of the hole being parallel to the axis of the cylinder. The hole is stepped, the smaller diameter end thereof being adjacent the disc and an annular member is fitted on the step thus formed. A cylindrical distance piece is fitted within the larger diameter of the hole, one end thereof abutting the annular member and the other end being provided with an inwardly-formed shoulder. The annular flange of the sleeve is located between said shoulder and said member. A helically wound spring is fitted between the said shoulder and a part spun on to the end of the sleeve remote from the flange.

The annular flange of the sleeve is normally seated on the shoulder of the distance piece and is capable of making a limited movement between said shoulder and the member seated on the step of the hole alongside the cylinder, and this distance represents the clearance of the pad from the disc when the braking pressure is removed, i.e. when the brake is idle.

When braking pressure is applied to the piston and cylinder mechanism the friction pads associated therewith are forced by the backing plate into frictional engagement with the disc, thereby braking the wheel. Movement of the backing plate in this direction draws the pins and the sleeve frictionally engaging therewith in the same direction and against the resistance of the springs. On removing of the braking pressure the springs, acting through the sleeve, move the pins back to their previous position, thus moving the backing plate and allowing the pad to move away from the disc to provide the predetermined degree of clearance.

If, on applying the brakes, the annular flange abuts the member before full frictional engagement between the pad and disc is effected, due e.g. to wear of the pad, then the braking pressure will cause the pins to slip

through the sleeves until full frictional engagement is effected. On removing the braking pressure the springs will retract the backing plates and allow the pads, as previously explained, to effect the predetermined running clearance.

Instead of the pin being tubular and slotted, as hereinabove described, it may be solid and provided with a longitudinal slot extending throughout its length, the slot having a depth equal to about three-quarter of its diameter. The parts of the pin on each side of the slot will thus be elastically deformed when a sleeve of suitable internal diameter is fitted thereon.

The pads may be cemented or otherwise secured to the backing plates.

Whilst the automatic adjustment with retraction means have been described in connection with a disc brake, it is, with minor modifications, equally applicable to a drum brake.

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Agent for the Applicants.

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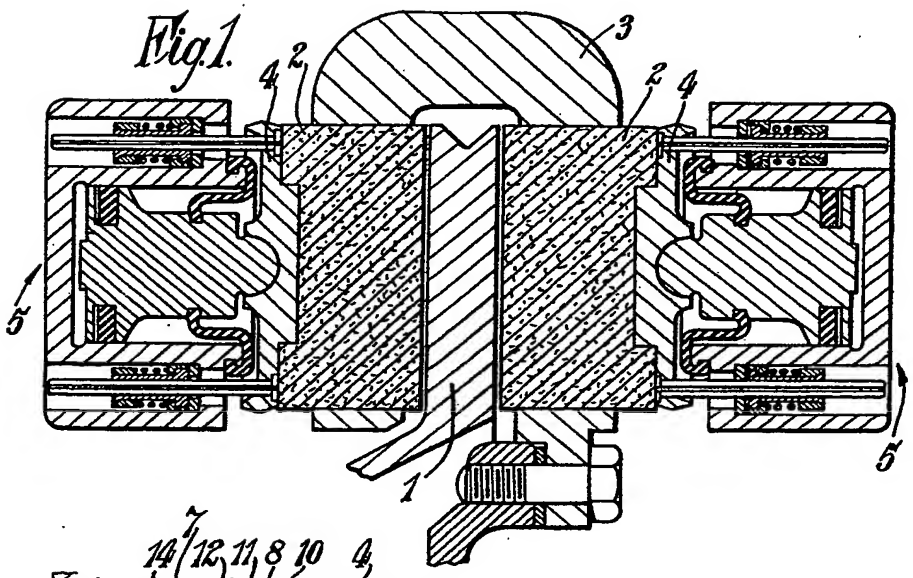
from which copies may be obtained.

747,972 COMPLETE SPECIFICATION
1 SHEET
This drawing is a reproduction of the Original on a reduced scale.

Fig.1.



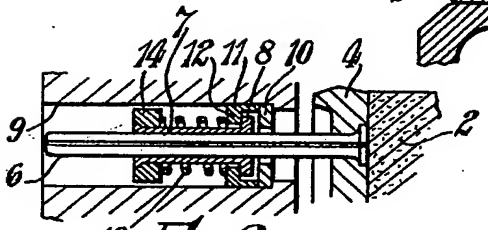


Fig.2.

Fig.4.

Fig.5.

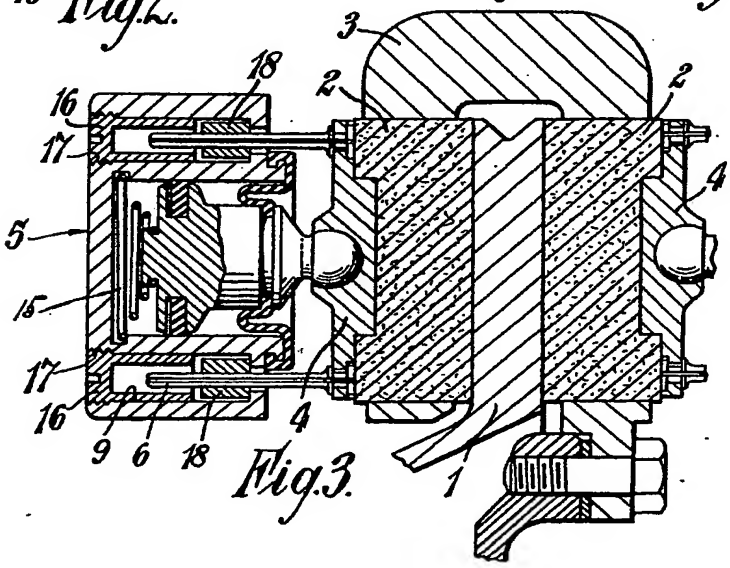


Fig.3.